

Fiber Optic Systems for Light Curing Rigidization of Inflatable Structures, Phase I

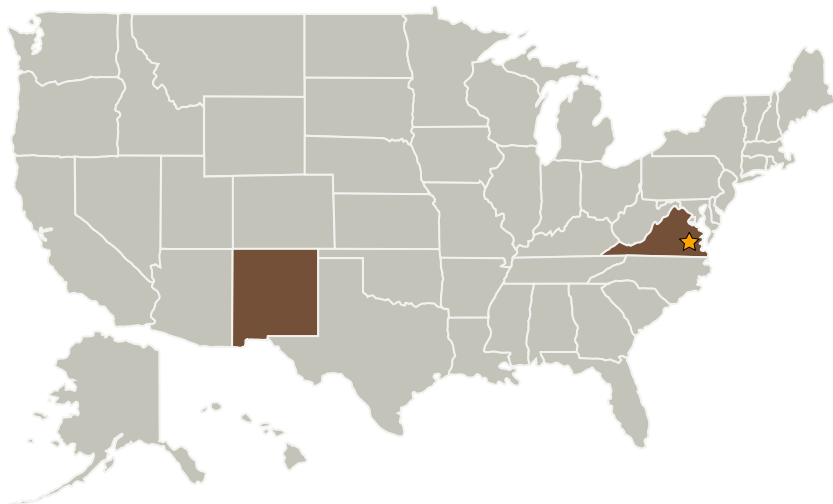
Completed Technology Project (2004 - 2004)



Project Introduction

Light (UV and visible) curing composite matrix resins are being explored as an attractive means for rigidizing inflatable spacecraft for large space-deployed structures such as solar sails, radar and communications antennas, radiometers, and solar arrays. Light curing provides a controlled, clean, low power rigidization technology to harden these inflatable spacecraft once they have achieved the required shape. The Phase I program will address the potential use of leaky fiber optics incorporated into the composite structure to provide cure illumination from a diode laser. Fiber optics are a potentially attractive alternative to illumination using LEDs. The advantage is that the fiber optics can be intimately commingled with the composite fibers and matrix resin so that the light located right in the area to be cured. Additionally, a single diode laser can illuminate numerous fiber optics, resulting in a potential weight savings and risk reduction. Matrix chemistry will be formulated to be compatible with the fiber optic illumination system and cure in the space environment using photocurable cationic epoxies. Thermal reversibility of photocured composites and the potential for self repair of misshapen structures will also be addressed. Sample composite tubes will be deployed and rigidized to demonstrate the concept at the end of the Phase I program.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Adherent Technologies, Inc.	Supporting Organization	Industry	Albuquerque, New Mexico

Primary U.S. Work Locations

New Mexico	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Andrea E Hoyt

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes